SURVEY OF WOOD FUEL USE IN PRINCE EDWARD ISLAND
1986-1987

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ABSTRACT

In May of 1987 a survey of 410 households was conducted in Prince Edward Island. This survey represented a 1% sample of the 41,000 households in the Province. The survey indicated that the average wood burning household consumes 5.6 cords of wood per year, an increase of just under 8% from the last survey in 1984-85. During this period the proportion of hardwood increased from 71.5% to 75%.

While just over 68% of the wood is burned by those who cut their own wood, the wood buyers burn a high (83%) percentage of hardwood and are much more likely to switch back to oil if hardwood shortages develop.

It is estimated that 23,180 households (55%) in P.E.I. burn 129,000 cords of fuelwood. This volume of fuelwood will displace 58.6 million litres of light fuel oil for a value of $19 million in displaced oil purchases.

SUMMARY OF FINDINGS

1. Sixty-one percent of the households surveyed burn some wood for space heating purposes. Because of an apparent bias in the sampling it is estimated that 55% of the households in P.E.I. burn wood.
2. Twenty-nine percent (35% in 1984-85) of those burning wood also heat their domestic hot water with this fuel.
3. Airtight wood stoves at 42% are still the most popular primary wood burning devices. Wood furnace/boiler at 27% and combination wood/oil furnace/boiler at 9% which are central heating devices make up the second largest group. Kitchen wood ranges at 10% are in third place.
4. Sixty-one percent of the wood burners have conventional oil fired central heating systems. (Another 12% have combination wood/oil central systems.)
5. Forty-nine percent of the wood burners have been using wood fuel for six or more years.
6. Eighty-nine percent of the wood burned is either 100% or 75% hardwood. Fifty percent of the wood buyers purchase only 100% hardwood.
7. Seventy percent of the wood burners use seasoned wood.
8. Sixty-one percent of the wood burners cut their own wood. Eighty percent of the wood cutters harvest from their own woodlot.
9. Forty-six percent of those cutting their own wood did so by clear cutting while the rest were more selective in harvesting from the woodlot.
10. While a significant number of wood cutters appear to be selective in their cutting practices only 6% were identified as participating in the government sponsored Forestry Management Program.
11. Sixty-two percent of the fuelwood cutters harvest in the fourth quarter of the year while 57% of the fuelwood buyers purchase their requirements during the second and third quarters of the year.
12. Eighteen percent of the wood buyers purchase blocked and split, a further 50% split their own wood while the remainder block and split their wood.
13. The average price for a cord of fuelwood has risen $5 a cord to $76 since the last survey in 1984-85.
14. Householders who cut their own fuel consumed 6.2 cords while fuelwood buyers averaged 4.6 cords. The average consumption for all wood burners was 5.6 cords.

15. Wood burning is predominantly a rural phenomena with 3 out of every 4 survey households indicating that they burn wood. In the urban areas almost the reverse is true with 72% of the households non-wood burners. As a result of our under representation of renters it is expected that the proportion of non-wood burners in urban areas should be higher than 72%.
16. Two out of every 3 households in Prince and Kings Counties are wood burners with cutters outnumbering buyers by 2.5 to 1.
17. Forty-four percent of the households in Queens County do not burn wood while the remainder are equally split between wood cutters and buyers.
18. Wood burners feel a little less secure about obtaining adequate supplies of hardwood.
19. Sixty-nine percent of wood cutters and 33% of wood buyers will substitute softwood for a shortfall in hardwood. The above, which account for 55% of all wood burners surveyed represent the solid base of wood burners. Twenty percent of the wood cutters and 44% of the wood buyers would rather substitute oil than switch to softwoods.
20. Only 4% of the wood burners realized that fuel oil prices dropped substantially in 1986.
21. About 58% of the wood burning respondents did not feel that fuel oil prices would have any effect on the amount of wood they would burn. About 20% indicated that fuel oil prices would cause them to burn more wood while about 20% did not know how to respond.
22. Nearly 70% of the wood cutters feel that economics was the most important reason for burning wood, while 43% of the wood buyers gave this reason. The response of the non-wood burners was very similar to the wood buyers.
23. Labour, dirt and safety were the most frequently quoted disadvantages to burning wood.

INTRODUCTION

The fifth in a series of fuelwood surveys in Prince Edward Island was conducted in May 1987. The first two surveys were carried out during the winters of 1980 and 1981 by the Institute of Man and Resources (IMR) which operated under the Canada-P.E.I. Agreement on Renewable Energy Development. The next two studies, in 1983 and 1985, were conducted by Resource Ventures Incorporated (RVI) (a subsidiary of IMR). These two studies were commissioned by the Prince Edward Island Energy Corporation. The current study was commissioned by the P.E.I. Department of Energy and Forestry.

Some of the survey questions require the respondent to supply quantitative information. No attempt has be made to determine the respondents ability to answer these questions accurately, we can only assume that the answers are in the "ball park". In general the results should be viewed as a fuzzy snapshot of what is going on with wood fuel and householders attitudes towards it.

The results of this study indicate that the proportion of householders using wood fired space heating systems has remained relatively constant since the last survey; there are indications however that the amount of wood consumed by heating systems has increased and that the proportion of hardwood used has also increased.

The first study conducted in 1980 surveyed only owner occupied households. Subsequent studies, including this one, attempted to survey all households thus eliminating the owner occupied bias. The 1987 survey included a question about whether the occupant owned the dwelling or rented it. This question was not included before. The results of this question indicated that the sampling method produced a significant bias toward owner occupied housing. The implications and effect of this bias will be discussed within the report.

The primary objectives of this study remain the same as previous studies, namely to determine:

1. the number of households burning wood for space heating requirements;
2. the primary wood burning appliances utilized by the households;
3. the sources of the fuelwood;
4. the consumption of fuelwood in the province; and
5. the trends and variations based upon data from all five fuelwood studies.

Because of the information derived from previous studies and the developments in the price of oil since the last study a number of additional objectives have been included in this study:

1. to determine the effect, if any, of relatively lower prices of residential fuel oil;
2. to examine how wood burners perceive the security of supply of hard and softwood and what action they are likely to take should supply or availability problems develop;
3. to determine what wood burners and non-wood burners view as the major advantage and disadvantage of heating with wood; and
4. to examine the demographic factors.

METHODOLOGY

1. Random Sampling: The 1986 Census determined that there were 40,872 households in P.E.I. A one percent sample (410) of these households was drawn randomly from the 1986 edition of the P.E.I. telephone directory. The household telephone numbers were established by matching computer generated random numbers to telephone numbers in the directory. This was carried out by matching the first two or three digits of the random number to numbered columns in the directory and the last two digits to the position of the number in the column.

2. The Questionnaire: The 1984-85 questionnaire was used as the starting point for developing the 1987 questionnaire. Two-thirds of the 1984-85 questionnaire were kept with only minor modifications. One question was dropped entirely while the rest were modified for clarity and expanded to meet the objectives. The revised questionnaire was reviewed and approved by representatives of the Department of Energy and Forestry and the P.E.I. Energy Corporation.

Prior to general application of the survey, it was tested on 25 respondents to determine if there were any unforeseen problems. The test proved to be satisfactory and the survey was carried out.

3. Survey Bias: The potential for bias in any survey is always a possibility. In the first wood survey a bias toward owner occupied homes was consciously built into the administration of the questionnaire, i.e. householders who rented their dwellings were specifically excluded from the questionnaire. The next four surveys included all households provided that they had telephone service and that their number was listed in the directory.

This survey followed the same procedures as carried out in previous surveys. In this survey, however, the respondents were asked whether they owned or rented the homes they were living in. In the survey 90% responded that they owned their homes. The 1981 Census data reported 75% of the households owned their own homes. Information obtained from the P.E.I. Housing Corporation indicated that this ownership ratio had not changed since 1981.

This difference raises two questions: what caused this difference in the sample; and what effect will this have on the results?

To examine this we must consider the following:

1. In 1985 The Island Telephone Co., Ltd. had 41,971 residential telephone lines. This is well in excess of the 40,862 households reported in the 1986 Census which would indicate an extremely high percentage of homes with telephones.
2. The telephone directory used at the time of the survey was almost one year old (the 1987 directory was released soon after the survey was completed) and would be missing some of the housing completed and occupied during the previous 12 months. Officials at Island Telephone report that most of the residential installation work involves a relatively small number of households which move from one rental property to another. This use of a relatively old book would cause errors with both owners and renters, but should not affect their relative importance.

While the timing of the survey may have caused some minor errors, they certainly do not account for the rental households being under represented in the survey.

There are only two possible answers to this under representation: households do not like to admit that they do not own the home they live in; or the relatively high percentage of singles and single parent families in rental accommodation means that they are relatively difficult to contact by phone.

The effect of this distortion is probably rather minor in terms of surveying homeowners. If anything it probably means a somewhat larger sampling and smaller errors, however on the rental side it probably means a much larger error which we have tried to reflect in the calculation of wood consumption.

4. Significance of the Results: In reviewing the following results care must be exercised in their interpretation. As an example most household residents would have an accurate idea of what kind of fuel they use to heat their home, i.e. wood or fuel oil, while they will not all know with equal precision how much fuel was consumed in the last heating season or whether the fuel was 100% hardwood or some mixture of hard and softwood.

An example of the problem of establishing the significance of results is the following. Residents were asked how much fuel they burned last year. The answers were grouped and statistically analysed. The mean increased from 5.2 cords to 5.6 cords between 1984-85 and 1986-87. The standard deviation of

increase slightly over the same period from 2.17 to 2.34. Statistical analysis will show that we can be 95% confident that the 1986-86 average is greater than 1984-85. If we adjust the data to reflect the heating degree days (see page 20) the confidence level that average consumption in 1986-87 is larger than 1984-85 drops to 75-80%. While we can make these statements about this data, we have not determined the respondents ability to estimate wood consumption. We can only assume that the individual estimates are not wildly off and that there were just as many over estimates as there are who under estimated.

RESULTS OF THE 1987 P.E.I. FUELWOOD SURVEY

1. Profile of All Wood Users in Prince Edward Island

While some difficulties have already been noted with the apparent bias in the survey method toward owner occupied households, the survey data revealed that 61.5% (252 of a sample of 410) of households burn some wood for space heating purposes. This percentage is almost identical to the 1985 survey result of 61.4% (231 of a sample of 376) of households who burn wood. While the question of ownership was not asked in the 1985 survey the similarity of these results would indicate that we are at least dealing with the same population which may not be representative of the province's household population (see Methodology).

The breakdown of the primary wood burning appliances utilized is listed in the following table.

TABLE 1

Primary Wood Burning Appliances of Wood Users

(N = 252)

	Wood Cutters		Wood Buyers		Wood Users	
	households	%	households	%	households	%
Airtight wood stove	61	39.4	45	46.4	106	42.1
Wood furnace/boiler	46	29.7	21	21.6	67	26.6
Kitchen wood range	20	12.9	6	6.2	26	10.3
*Kemac	6	3.9	11	11.3	17	6.7
Combination (wood/oil) furnace/boiler	18	11.6	6	6.2	24	9.5
Non-airtight wood stove	3	1.9	2	2.1	5	2.0
Open fireplace	1	0.6	0	0.0	1	0.4
Fireplace insert	0	0.0	6	6.2	6	2.4
Total	155	100.0	97	100.0	252	100.0

*Kemac is the trade name for a common oil assist unit attached to the back of a wood burning kitchen range. The Kemac and other similar units, such as the Boston Breeze, were commonly used through the 1950's, 60's and 70's in Prince Edward Island. Initially such units were used to assist in the burning of wood, but as oil became more common and cheap, many householders stopped using wood and relied entirely upon oil.

It is interesting to note that wood buyers have a higher percentage of airtight stoves and fireplace inserts while the wood cutters have higher percentages of wood and wood/oil furnaces as well as wood kitchen ranges.

The other heating systems of wood burners are as follows:

TABLE 2

Other Heating Systems of Wood Users

(N = 252)

	Households	% Response
Hot air oil furnace	88	34.9
Wood unit(s) only	45	17.9
Hot water boiler	66	26.2
Combination (wood/oil) furnace/boiler	30	11.9
Oil space heater	6	2.4
Kerosene heater	1	0.4
Kemac	12	4.8
Electric heat	3	1.2
Coal	1	0.4
Total	252	100.0

While separate data for both wood cutters and buyers is not presented it is notable that the incidence of wood only units is twice as high with wood cutters as it is with wood buyers.

Among wood users, 29.0% heated all or some of their domestic hot water by burning wood. This is somewhat lower than the 35.0% recorded in the 1985 survey.

The following analysis of the duration of wood burning by respondents shows that 9.9% of these households started burning wood in the last two years versus 12.6% in the 1985 survey. The number who have been burning wood for six years or more increased from 40.7% to 48.8% during this same period.

TABLE 3

Duration of Wood Heat Use

(N = 252)

	Households	% Response
0 - 2 years	25	9.9
2 - 4 years	43	17.1
4 - 6 years	61	24.2
6 or more years	123	48.8
Total	252	100.0

Although it is not shown in the table over 51% of the wood burning respondents who cut wood have been burning wood for 6 or more years.

The following table describes the various wood types cut or purchased by wood burners.

TABLE 4

Wood Types Used in Space Heating

(N = 252)

	Wood Cutters		Wood Buyers		Total Wood Users	
	households	%	households	%	households	%
Softwood only	7	4.5	2	2.1	9	3.6
Hardwood only	28	18.1	49	50.5	77	30.6
75% Hard 25% Soft	88	56.8	36	37.1	124	49.2
50% Hard 50% Soft	27	17.4	9	9.3	36	14.3
25% Hard 75% Soft	5	3.2	1	1.0	6	2.4
Total	155	100.0	97	100.0	252	100.0

From the foregoing it is apparent that wood buyers are more particular about the type of wood they burn with 50% of the respondents claiming to burn only hardwoods and a further 37% claiming to burn a 75% hardwood 25% softwood mixture.

70% of the wood users reported burning seasoned wood with 26% claiming they burn a mixture of green and seasoned fire wood.

The sources of fuelwood are broken down in the following table.

TABLE 5

Sources of Fuelwood

(N=252)

	Households	% Response
Wood buyers	97*	38.5
Wood cutters	155	61.5
	252	100.0
Wood cutters own woodlot	133	80.0
Friends or neighbour's woodlot	29	18.1
Crown land	3	1.9
	155	100.0

*10 wood buyers also cut wood for their own use: 9 from their own woodlot and 1 from a friend's.

As noted above 61.5% of the wood burning respondents cut their own wood. In 1984-85 this percentage was reported to be 52.4% and 68.8% in 1982-83. There does not appear to be any logical explanation for this variation.

2. Profile of the Fuelwood Harvesters

Various harvesting methods are being used as shown in the following table.

TABLE 6

Harvesting Methods

(N=155)

	Households	% Response
Clear-cutting all trees	71	45.8
Removing dead trees	17	11.0
Thinning poor stock	25	16.1
Picking and choosing trees	33	21.3
Don't know	9	5.8
Total	155	100.0

The cut wood was moved from stump to household as shown in the following table.

TABLE 7

Transporting Fuelwood from Stump to Household

(N=155)

Method	Households	% Response
Tractor and trailer	95	61.3
Horse	5	3.2
Snowmobile/ATV	8	5.2
Skidder	1	0.6
Manual/truck	40	25.8
Portable winch	0	0.0
Tractor and winch	5	3.2
Don't know	1	0.6
Total	155	100.0

The survey questioned wood cutters about their participation in forestry management. Unlike the previous survey the question was limited to participation in the Government sponsored Forestry Management Program.

TABLE 8

Participation in the Government Sponsored Forestry Management Program

(N=155)

	Households	% Response
Yes	9	5.8
No	107	69.0
Don't know	9	5.8
No response	30	19.4
Total	155	100.0

Based on the results of this survey almost 95% of the household wood cutters either are unaware of the program or are not participating.

The fall period continues to be the most popular season for fuelwood harvesting as shown in the following table.

TABLE 9

The Season for Harvesting Fuelwood

(N=154)

	Household	% Response
January - March	12	7.8
April - June	24	15.6
July - September	22	14.3
October - December	96	62.3
Total	154	100.0

3. Profile of Fuelwood Purchasers

The purchasers are householders who buy fuelwood from commercial vendors or friends and neighbours. In the sample of wood purchasers only 48.5% of the respondents were able to define the dimensions of a cord of wood. This is a continuation of the drop from a high point in 1982-83 of 94.2%. In 1984-85 there were 68.5% who were able to correctly describe a cord of wood. It is difficult to tell whether this reflects problems with the way a question was asked or indicates that buyers are confident they are being delivered what they pay for and have no need to be able to measure what they are buying.

Fuelwood buyers are still putting a substantial amount of their own labour into purchased fuelwood as can be seen from the following table.

TABLE 10

Characteristics of Fuelwood at Time of Purchase

(N=97)

	Household	% Response
8' lengths	27	27.8
4' lengths	2	2.1
Blocked	48	49.5
Split wood	14	14.4
Softwood slabs	1	1.0
Slabs blocked	4	4.1
Chips and sawdust	0	0.0
Tree length	1	1.0
Total	97	100.0

The average price paid for a cord of fuelwood was calculated to be $76 an increase of $5 or 7% over the 1984-85 price. Eighty-two percent of the respondents stated that their fuelwood price included delivery.

Fuelwood purchasers like their fuelwood cutting counterparts tend to concentrate their purchases into the fall time frame.

TABLE 11

The Season for Purchasing Fuelwood

(N=97)

	Household	% Response
January - March	0	0.0
April - June	21	21.6
July - September	34	35.1
October - December	42	43.3
Total	97	100.0

It should be noted that more respondents were purchasing fuel during the spring and summer period (56.7%) then reported in the 1984-85 survey (44.1%).

4. Profile of Fuelwood Consumption in P.E.I. 1986-87 Heating Season

4.1 Average Fuelwood Consumption in the Province

For the 1986-87 heating season, Prince Edward Island wood burning households consumed an average of 5.57 cords of fuelwood an increase of 7.5% over the 1984-85 survey. Householders who cut their own fuel averaged 6.21 cords or 36% more fuelwood than the buyers who averaged 4.56 cords.

TABLE 12

Fuelwood Consumption for Wood Burning Households

(N=252)

	Wood Cutters		Wood Buyers			
Cords Burned	Households	%	Households	%	Total	% Response
0 - 1	0	0.0	2	2.1	2	0.8
1 - 2	1	0.6	7	7.2	8	3.2
2 - 3	11	7.1	16	16.5	27	10.7
3 - 4	14	9.0	16	16.5	30	11.9
4 - 5	23	14.8	23	23.7	46	18.3
5 - 6	22	14.2	10	10.3	32	12.7
6 - 7	16	10.3	7	7.2	23	9.1
7 - 8	19	12.3	5	5.2	24	9.5
8 or more	48	31.0	11	11.3	59	23.4
Don't know	1	0.6	0	0.0	1	0.4
Total	155	100.0	97	100.0	252	100.0

4.2 Profile of Respondents

The geograpnic breakdown of household respondents according to wnether they cut their own wood for heating, bought their wood or were non-wood users provides some interesting data. In the 1984-85 survey 71.3% indicated they lived in a rural area. In this survey 71.7% indicated living in a rural area indicating that the two surveys appear to have reached a similar distribution of respondents.

TABLE 13

Wood Cutters, Buyers and Non-Wood Users by County 1987

(N=410)

	% Wood Cutters	% Wood Buyers	% Non-Wood Users	% Respondents
Prince	42.6	28.9	29.7	34.4
Queens	33.5	56.7	53.8	46.8
Kings	23.9	14.4	16.5	18.8
Total	100.0	100.0	100.0	100.0

TABLE 14

County Distribution of Wood Cutters, Buyers and Non-Wood Users 1987

(N=410)

	% Prince	% Queens	% Kings	% Respondents
Wood cutters	46.8	27.1	48.1	37.8
Wood buyers	19.9	28.6	18.2	23.7
Non-wood users	33.3	44.3	33.7	38.5
Total	100.0	100.0	100.0	100.0

TABLE 15

Rural and Urban Distribution of
Wood Cutters, Buyers and Non-Wood Users 1987

(N=410)

	% Rural	% Urban	% Respondents
Wood cutters	49.0	9.5	37.8
Wood buyers	25.5	19.0	23.7
Non-wood users	25.5	71.6	38.5
Total	100.0	100.0	100.0

The data indicates that Prince and Kings county have a proportionately greater share of households who burn wood and who cut their own wood, while Queens county has the largest share of wood buyers and non-wood burners. The urban respondents as one would expect show a large proportion of non-wood users. As previously noted householders who rent are under represented in the survey. We would thus expect that the urban proportion of non-wood users would be somewhat higher than reported.

5. Profile of Non-Wood Users in Prince Edward Island

Oil fired hot water boilers continue to be the most prevalent heating system following by oil fired warm air furnaces. Table 16 details the heating systems of non-wood burning households.

TABLE 16

Heating Systems of Non-Wood Users 1987

(N= 158)

Heating System	Household	% Response
Oil fired forced air	63	39.9
Oil fired hot water	72	45.6
Electric heat	5	3.2
Oil space heater	3	1.9
Propane heater	1	0.6
Heat supplied by landlord	12	7.6
No response	2	1.3
Total	158	100.0

In response to the question of whether they had burned wood during the last 15 years, 27.2% indicated they had while 69.1% had not with 3.5% declining to answer.

When respondents were asked whether they were considering heating with wood in the future only 12.0% indicated they were, while 76.6% were not interested and 13.6% did not know.

6. Security of Supply

In the previous survey the respondents were asked simply if they were confident about their supply of wood. 83% of the wood cutters were confident about their wood availability and 76% of the wood buyers were confident about their supply.

In the 1987 survey the security question was rephrased from a general question about availability (see Appendix A, questions 14 and 21) to specific questions about the availability of softwoods and hardwoods (see Appendix B, questions 13, 14 for cutters and 23, 24 for buyers).

TABLE 17

Confidence in Being Able to Acquire Fuelwood Over Next Five Years

(N=252)

	Wood Cutters	Wood Buyers	Total Wood Users	
	% response	% response	households	%
Softwood				
Yes	73.5	56.7	169	67.0
No	5.8	5.2	14	5.6
Don't know	20.7	38.1	69	27.4
Total	100.0	100.0	252	100.0
Hardwood				
Yes	74.2	69.1	182	72.2
No	5.8	3.1	12	4.8
Don't know	20.0	27.8	58	23.0
Total	100.0	100.0	252	100.0

The above hardwood section of the table would indicate that the confidence level has declined from what was reported in 1984-85. While the confidence level on hardwood seems to be declining one should have expected that the confidence levels for softwood would have been close to 100%. It would appear therefore that some unidentified factor is affecting this result, e.g. about 80% of the wood cutters harvest wood from their own woodlot, it may be that some of these woodlots are too small to support the current and anticipated cutting level. In the case of wood buyers, as can be seen in Table 4 and in the following, Table 18, they are much more interested in burning hardwoods and more than 56% would switch some or all of their wood consumption to oil rather than burn softwood. It would therefore seem reasonable to assume that the wood buyers 38.1% response of "don't know" to the security question on softwood could be interpreted as "don't care".

In Table 18 are the more interesting responses to the question of what wood burners will do if they have difficulty in obtaining hardwood.

TABLE 18

If Insufficient Hardwood Available What Will Happen 1987?

(N=252)

	Wood Cutters		Wood Buyers		Total Wood Users	
	households	%	households	%	households	%
Burn hardwood and available softwood	107	69.0	32	33.0	139	55.2
Burn hardwood and some fuel oil	30	19.4	43	44.3	73	29.0
Switch to fuel oil	9	5.8	12	12.4	21	8.3
Don't know	9	5.8	10	10.3	19	7.5
Total	155	100.0	97	100.0	252	100.0

The foregoing table shows:

(a) the wood cutters commitment to wood burning;

(b) the wood buyers preference for hardwood fuels; and

(c) 139 out of the 252 (55%) wood burners would switch to softwoods rather than oil. These could be described as the hard core wood burners.

7. The Effect of Fuel Oil Prices on Wood Fuel Heating

During 1986, for the first time in over a decade the price of fuel oil dropped by 8¢ per litre. To determine the effect, if any, this had on wood fuel heating a series of three questions were asked to respondents:

1. Did they recognize that the price of oil had declined in 1986?;
2. Did that have any effect on the use of wood fuel this heating season?; and
3. Did they expect the price of fuel oil to have an effect on wood use next heating season?

The following three tables summarize the results of these questions (see Appendix B, questions 27, 28 and 29)

TABLE 19

What Happened to Fuel Oil Prices in 1986?

(N=252)

	% Wood Cutters	% Wood Buyers	Total Households	% Response
Oil Prices:				
Stayed about the same	15.5	12.4	36	14.3
Went up slightly	19.4	25.8	55	21.8
Went down slightly	32.9	33.0	83	32.9
Dropped quite a bit	4.5	3.1	10	4.0
Don't know	27.7	25.8	68	27.0
Total	100.0	100.0	252	100.0

TABLE 20

Did the Price of Fuel Oil Have an Affect on Wood Fuel Use this Season?

(N=252)

	% Wood Cutters	% Wood Buyers	Total Households	% Response
Used more wood	23.2	20.6	56	22.2
Stayed about the same	55.5	64.9	149	59.1
Used less wood	1.9	3.1	6	2.4
Switched to oil	0.0	0.0	0	0.0
Don't know	19.4	11.3	41	16.1
Total	100.0	100.0	252	100.0

TABLE 21

Do You Expect the Price of Fuel Oil to Affect Wood Fuel the Next Season?

(N=252)

	% Wood Cutters	% Wood Buyers	Total Households	% Response
Will use more wood	19.4	17.5	47	18.7
Stay about the same	54.2	62.9	145	57.5
Used less wood	3.9	3.1	9	3.6
Switch to oil	0.0	0.0	0	0.0
Don't know	22.6	16.5	51	20.2
Total	100.0	100.0	252	100.0

Only 37% of the wood burning respondents recognized that there had been a drop in fuel oil prices and only 11% of these recognized that there had been a substantial drop. While 20-27% of the respondents didn't know what the effect of fuel oil prices would be or had been on fuel wood use. Almost all the rest (except 4%) experienced or expected their use of fuel wood to rise or stay the same.

8. The Advantages and Disadvantages of Heating with Wood Fuel

While this subject has been examined before it seemed appropriate to have another look at it. We have divided the respondents into the same group as have been looked at in other questions.

TABLE 22

Major Advantage of Heating with Wood Fuel 1987

(N=410)

	Wood Cutters % response (N=155)	Wood Buyers % response (N=97)	Non-Wood Users % response (N=158)	Total households	%
Economic	68.4	43.3	40.5	212	51.7
Other reasons	31.6	56.7	59.5	198	48.3
Total	100.0	100.0	100.0	410	100.0

TABLE 23

Major Disdvantages of Heating with Wood 1987

(N=410)

	Wood Cutters % response (N=155)	Wood Buyers % response (N=97)	Non-Wood Users % response (N=158)	Total households	%
Problems obtaining fuel	0.6	0.0	2.5	5	1.2
Too much labour	32.9	38.1	29.1	134	32.7
Dirty	44.5	38.1	37.3	165	40.2
Safety	20.6	20.6	27.2	95	23.2
Capital cost	0.6	1.0	2.5	6	1.5
Wood cost	0.6	2.1	1.3	5	1.2
Total	100.0	100.0	100.0	410	100.0

From the foregoing a number of observations can be made:

(a) economics is an important issue with wood cutters while wood buyers consider economics only slightly more important than non-wood users. In the previous survey 47.6% of the non-wood users felt that economics was the most important issue.

(b) all three groups indicate the major problems with wood burning are the amount of personal labour required, it is a dirty operation and it is subject to an element of risk.

(c) the wood cutters are most concerned with the dirt, wood buyers with the labour component and the non-wood users with the safety aspect.

9. Comparative Data from Five Fuelwood Surveys

9.1 Wood Burning Households

Table 24 outlines the percentage of P.E.I. households burning wood in the 1979-80, 1980-81, 1982-83, 1984-85 and 1986-87 surveys.

TABLE 24

Survey Households Burning Wood in Prince Edward Island Between 1979 and 1987

	1979-1980 Survey	1980-1981 Survey	1982-1983 Survey	1984-1985 Survey	1986-1987 Survey
% Response	54.4%*	62.0%	60.4%	61.4%	61.5%

*This survey covered only owner occupied households. Just over 70% of the owner occupied households burned wood. The 54.4% response was calculated on the assumption that none of the rental occupied homes burned wood.

In the current survey one question asked the respondents whether they rented or owned their homes. Just under 90% responded that they were owners. According to the 1981 Census just over 75% are owners and information* obtained from the P.E.I. Housing Corporation would indicate that this percentage has not changed since that time.

While 61.5% of the respondents reported burning wood, 66% of the owner occupied households and 21% of the rental occupied households reported burning

*Private conversation with Mr. Don Pridmore of the P.E.I. Housing Corporation.

wood. Based on an estimated 41,980 households it is calculated that there are 21,000 owner occupied and 2,180 rental occupied wood burning households for a total of 23,180 households. This represents 55.2% of the households in P.E.I. and is very similar to the data calculated for 1978-80. The 95% confidence limits would be ±2900 households or 48.3%±62.0 of the households burn wood (see Appendix C).

A recalculation of the 1984-85 survey and household data would indicate 21,980 wood burning householders.

9.2 The Average and Total Consumption of Fuelwood

In Table 25 the data from previous surveys have been adjusted based on the assumption that wood burning households as surveyed between 1980-81 and 1984-85 would have provided the same home ownership information as discussed in section 9.1.

TABLE 25

Households, Wood Burning Households, Household Fuelwood Consumption and Total Fuelwood Consumption in P.E.I., 1980-1981 to 1986-1987

	1980-1981 Survey	1982-1983 Survey	1984-1985 Survey	1986-1987* Survey
Households	37,660	38,200	39,900	41,980
Owner/rental	75/25%	75/25%	75/25%	75/25%
Wood burning households	20,760	21,090	21,980	23,180
Average consumption/ household (cords)	3.90	4.89	5.18	5.57
Total residential consumption (cords)	81,000	103,000	114,000	129,000
Heating degree/day index (based on avg. 4688.6 dd)	0.979	0.912	1.038	1.065
Adjusted avg. consumption/ household (cords)	3.98	5.36	4.99	5.23

NOTE: From section 9.1 it was stated that the number of wood burning households in 1986-87 were 23,180 and that the 95% confidence limits would be ±2900 households. Applying this range to the average consumption would lead to residential fuelwood lying between 113,000 to 145,000 cords.

The adjusted average household wood consumption represents consumption with the effects of colder or warmer than normal winters removed. Its significance is however difficult to determine because we do not have any idea

of the accuracy of the consumption figures supplied by households. It is interesting to note that the high consumption in 1982-83 corresponds to the period where government grants were most active.

From the question on wood types used for space heating it was calculated that 75% of the wood consumed was hardwood. This compares with the 1984-85 survey which yielded a 71.5%.

The hardwood fuel consumption in P.E.I. for 1986-87 should lie between 85,000 and 108,000.

9.3 Primary Wood Burning Appliances

Table 26 describes the primary wood burning appliances identified in the five separate surveys.

TABLE 26

Comparison of Wood Burning Appliances in Wood User Households in P.E.I., 1980-1981 to 1986-1987

Wood Burning Appliance	1980-1981 Survey	1982-1983 Survey	1984-1985 Survey	1986-1987 Survey
Airtight stove	20.0%	37.4%	45.9%	42.1%
Wood furnace/boiler	9.0	26.9	17.7	26.6
Kitchen wood range	10.0	18.5	13.9	10.3
Kemac	25.0	6.6	5.6	6.7
Combination furnace	7.0	4.9	5.2	9.5
Non-airtight stove	19.0	3.6	5.2	2.0
Open fireplace/ fireplace insert	3.0	2.1	3.5	2.8

9.4 Wood Fired Domestic Hot Water

TABLE 27

Households Using Wood Fired Domestic Hot Water Among Wood User Households in P.E.I., 1980-1981 to 1986-1987

1980-1981 Survey	1982-1983 Survey	1984-1985 Survey	1986-1987 Survey
24.0%	39.7%	35.1%	29.0%

9.5 Acquisition of Fuelwood

TABLE 28

Sources of Fuelwood Among Wood User Households in P.E.I. 1980-1981 to 1986-1987

	1980-1981 Survey	1982-1983 Survey	1984-1985 Survey	1986-1987* Survey
Harvested fuelwood	67.0%	58.2%	52.4%	63.5%
Purchased fuelwood	32.0%	31.8%	47.6%	36.5%

*Note 4.0% both cut and buy fuelwood, half have been recorded as cutters and half as buyers for purposes of this analysis.

9.6 Cutting Patterns of Wood Fuel Harvesters

Table 29 indicates how harvesters have used their wood lots. Clear cutting has remained constant since the last survey while the removal of dead trees has dropped and thinning operations and selecting fuelwood trees has increased.

TABLE 29

Methods of Harvesting Wood Fuel Among Harvesters in Prince Edward Island, 1980-1981 to 1986-1987

	1980-1981 Survey	1982-1983 Survey	1984-1985 Survey	1986-1987* Survey
Clear cutting all trees	84.0%	60.9%	45.8%	45.8%
Removing dead trees	7.0	7.7	19.2	11.0
Thinning poor stock	8.0	19.2	10.0	16.1
Selecting fuelwood trees	1.0	12.2	12.5	21.3
Don't know	0.0	0.0	12.5	5.8
Total	100.0%	100.0%	100.0%	100.0%

9.7 Characteristics of Purchased Fuelwood

The form in which most fuelwood is purchased is shown in Table 30. Similar to past surveys 8' lengths, blocked and blocked and split continues to be the most popular form for purchasing fuelwood.

TABLE 30

Types of Purchased Fuelwood Among Wood Fuel Purchasers in Prince Edward Island, 1980-1981 to 1986-1987

	1980-1981 Survey	1982-1983 Survey	1984-1985 Survey	1986-1987* Survey
8' lengths	24.0%	28.2%	20.7%	27.8%
Blocked	40.0	52.1	53.1	49.5
Split wood	36.0	11.3	15.3	14.4
Chips/sawdust/pellets	0.0	4.2	0.0	0.0
4' lengths	0.0	1.4	0.9	2.1
Slabs	0.0	2.8	1.8	5.1
Tree lengths standing	0.0	0.0	8.1	1.0

9.8 Average Price of Purchased Fuelwood

The data from the 1986-87 survey provides an average purchase price for fuelwood of $76.50 per cord. The 1984-85 survey determined that the average price was $71.00 per cord. This price increase is just over 3% per year.

10. Available Heat (1986-87)

The available heat is calculated by multiplying the estimated volume of wood by the heat content per cord by the estimated efficiency of the wood burning equipment. Using the 1986-87 consumption of 129,000 cords, a 45% burning efficiency and a heat content of 23 x 10^6 BTU's per cord (75% hardwood, 25% softwood) the following available heat is produced.

Available heat = 129,000 cords x 0.45 (efficiency) x 23 x 16^6 BTU's
= 1.34 x 10^{12} BTU's

11. Light Fuel Oil Displacement

To calculate the potential volume of light fuel oil displaced by wood we can substitute 100 gal. (455 l) of fuel oil for a cord of fuelwood, thus

129,000 cords = 12,900,000 gals. (58,600,000 litres) of oil at $1.47/gal. (32.3¢/litre)

12.9 x 10^6 gals. x $1.47/gal. = $19 x 10^6 or $19 million in displaced oil purchases

DISCUSSION

In the 1982-83 and 1984-85 Wood Fuel Surveys particular attention was drawn to the fact that Prince Edward Island residents use a high proportion of hardwoods for home heating. In 1984-85 it was calculated from the survey data that 71.5% or 82,000 cords of the fuelwood burned was hardwood. In this survey the proportion of hardwood has increased to 75% or 97,000 cords (range 85-108,000 cords). From the survey it was found that wood buyers use 83% hardwood while wood cutters use about 70% hardwood. About 68% of the wood buyers purchase wood in a blocked or blocked and split condition which requires relatively little labour.

The 1986-87 survey also indicated 26% of the wood cutters and 30% of the wood buyers are not confident about their supply of hardwood fuel and 25% of the wood cutters and 57% of the wood buyers indicated they would switch some or all of their heating requirements to fuel oil.

It is interesting to note that in the 1984-85 Survey the price of fuel oil was quoted at 38.9¢/litre and in this survey the price is 32.5¢/litre or 16.5% lower. Thus in spite of lower oil and higher round wood prices the market has continued to grow.

The indications from the foregoing is that under present circumstances further development of the residential round wood heating market will be very dependent on the future availability of hardwood.

The P.E.I. Department of Energy and Forestry's* best estimate for the hardwood resource is an annual sustainable cut of between 70 and 100,000 cords. The higher number includes white birch and some poplar which is most common in the western part of the province. With silviculture better productivity is possible leading to sustainable cuts between 100 and 135,000 cords.

Based on a 3% annual growth rate and assuming improved productivity due to silviculture, there would appear to be room for 5 - 10 years of further growth in residential round wood heating without putting undue pressure on the resource.

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*Private conversation with Bill Glen of the P.E.I. Deptartment of Energy and Forestry.

However, a number of questions can be raised which cannot be answered with the information available.

1. Will the silviculture activities be able to improve the productivity of a relatively low value product?
2. While it appears that hardwood fuel production has been able to keep pace with demand, are there some accessability questions which may come into play in the future, i.e. have fuelwood cutters taken out the hardwood which is easy to get at, while the next cuts may be more difficult and expensive?
3. At what point do wood burners tire of the labour and dirt associated with round wood burning.

These three factors although difficult to quantify at the present time can have a profound effect on future fuelwood consumption.

APPENDIX A

1984-1985 P.E.I. FUELWOOD SURVEY

1. Are you using wood to heat your home?
   (1) yes (2) no

Wood Using Respondents

2. What other type of heating system do you have in your home?
   (1) wood unit only (2) hot air oil furnace
   (3) hot water oil furnace (4) electric heat
   (5) combination wood/oil furnace (6) oil space heater
   (7) kerosene heater (8) Kemac
   (9) coal
3. What is the main wood burning unit used in heating your home?
   (1) Kemac (2) kitchen wood stove
   (3) airtight wood stove (4) Franklin/non-airtight
   (5) wood furnace (6) combination wood/oil furnace
   (7) fireplace insert (8) fireplace (open)
4. Is wood heating your domestic hot water?
   (1) yes (2) no
5. How long have you been using wood to heat your home?
   (1) 0 - 2 years (2) 2 - 4 years (3) 4 - 6 years (4) over 6 years
6. What type of wood are you burning?
   (1) only softwood (2) only hardwood (3) mainly sawmill waste
   (4) mixture: H(75%), S(25%) (5) H(50%), S(50%) (6) H(25%), S(75%)
   (7) wood pellets
7. Are you burning green or seasoned wood?
   (1) green (2) seasoned (3) mixture of both
8. Where are you getting your wood?
   (1) personal woodlot (2) friend's woodlot (3) Crown land
   (4) purchase - neighbour/friend (5) purchase - commercial (6) sawmill waste

If Woodlot Cutters

9. What type of cutting are you doing from the woodlot?
   (1) clear cutting (2) salvaging dead trees (3) thinning poor stock
   (4) pick and choose (5) don't know

10. How do you get wood from stump to roadside or house?
    (1) tractor/trailer (2) tractor/winch (3) horse (4) snowmobile
    (5) skidder (porter-forwarded) (6) manual/truck (7) yard-arm (8) don't know
11. (a) Are you involved in a forestry management program?
    (1) yes (2) no (3) don't know
    (b) Is your forestry management program a federal/provincial government program?
    (1) yes (2) no (3) don't know
12. Is your woodlot providing wood fuel for other wood burners?
    (1) yes (2) how many? (3) no
13. At what time of the year do you usually cut your supply of wood?
    (1) January - March (2) April - June (3) July - September
    (4) October - December
14. Are you confident of your supply of wood?
    (1) yes (2) no (3) don't know

<u>If Purchasing Wood</u>

15. Do you know the dimensions of a full cord of wood?
    (1) yes (2) no
16. How are you buying your wood?
    (1) 8 ft. lengths (2) blocked (3) blocked and split
    (4) wood chips/sawdust (5) tree length standing (6) 4 ft. lengths
    (7) pellets (8) slabs - 8 ft. lengths (9) slabs - blocked
17. How much do you pay for a cord of hardwood?
    (1) $30 - $40 (2) $40 - $50 (3) $50 - $60 (4) $60 - $70 (5) $70 - $80
    (6) $80 - $90 (7) $90 - $100 (8) $100 - $110 (9) $110 - $120
18. Does the price you paid for wood include delivery of the wood?
    (1) yes (2) no (3) don't know
19. At what price per cord would you switch to burning softwood?
    (1) $20 - $30 (2) $30 - $40 (3) $40 - $50 (4) $50 - $60 (5) $60 - $70
    (6) don't know (7) would not switch to softwood
20. At what time of year do you usually purchase your supply of wood?
    (1) January - March (2) April - June (3) July - September
    (4) October - December
21. Are you confident about the availability of your supply of purchased wood?
    (1) yes (2) no (3) don't know

Continue - Wood Using Respondents

22. How many cords of wood did you burn last year (1983 - 1984)?
    (1) 0 - 1 (2) 1 - 2 (3) 2 - 3 (4) 3 - 4 (5) 4 - 5 (6) 5 - 6
    (7) 6 - 7 (8) 7 - 8 (9) 8 or more
23. How many cords of wood do you expect to burn this year (1984 - 1985)?
    (1) 0 - 1 (2) 1 - 2 (3) 2 - 3 (4) 3 - 4 (5) 4 - 5 (6) 5 - 6
    (7) 6 - 7 (8) 7 - 8 (9) 8 or more

Non-Wood Using Respondents

24. What type of heating system do you have in your home?
    (1) hot air oil furnace (2) hot water oil furnace (3) electric heat
    (4) oil space heater (5) propane heater (6) coal stove
    (7) coal furnace
25. Have you used wood to heat your home during the past 15 years?
    (1) yes (2) no (3) don't know
26. Are you considering heating with wood in the future?
    (1) yes (2) no (3) don't know
27. Do you feel people heating with wood are saving money on their fuel costs?
    (1) yes (2) no (3) don't know

General Information (All Respondents)

28. In what county of Prince Edward Island do you live?
    (1) Prince (2) Queens (3) Kings
29. Are you residing in an urban or rural area?
    (1) rural (2) urban
30. If urban Charlottetown or Summerside?
    (1) Charlottetown (2) Summerside

1986-1987 P.E.I. FUELWOOD SURVEY

1. Are you using wood to heat your home?
   (1) yes (2) no
   IF YES GO TO QUESTION 2. IF NO GO TO QUESTION 30.

Wood Using Respondents

2. What other type of heating system do you have in your home?
   (1) wood unit only (2) hot air oil furnace
   (3) hot water oil furnace (4) electric heat
   (5) combination wood/oil furnace (6) oil space heater
   (7) kerosene heater (8) Kemac
   (9) coal
3. What is the main wood burning unit used in heating your home?
   (1) Kemac (2) kitchen wood stove
   (3) airtight wood stove (4) Franklin/non-airtight
   (5) wood furnace (6) combination wood/oil furnace
   (7) fireplace insert (8) fireplace (open)
4. Is wood heating your domestic hot water?
   (1) yes (2) no
5. How long have you been using wood to heat your home?
   (1) 0 - 2 years (2) 2 - 4 years (3) 4 - 6 years (4) over 6 years
6. What are the dimensions of a full cord of wood?
   (1) know (2) don't know
7. Are you burning green or seasoned wood?
   (1) green (2) seasoned (3) mixture of both
8. Where are you getting your wood?
   (1) cut from woodlot (2) purchase
   IF 8 (1) CONTINUE TO QUESTION 9, IF 8 (2) GO TO QUESTION 18.

If Woodlot Cutters

9. What type of cutting are you doing from the woodlot?
   (1) clear cutting (2) salvaging dead trees (3) thinning poor stock
   (4) pick and choose (5) don't know
10. What kind of wood are you cutting for your fuel?
    (1) only softwood (2) only hardwood (3) mixture: H(75%), S(25%)
    (4) H(50%), S(50%) (5) H(25%), S(75%)

11. How do you get wood from stump to roadside or house?
    (1) tractor/trailer (2) tractor/winch (3) horse
    (4) snowmobile/ATV (5) skidder (porter-forwarded) (6) manual/truck
    (7) portable winch (8) don't know
12. At what time of the year do you usually cut your supply of wood?
    (1) January - March (2) April - June (3) July - September
    (4) October - December
13. Can you get enough softwood to cut for the next 5 years?
    (1) yes (2) no (3) don't know
14. Can you get enough hardwood to cut for the next 5 years?
    (1) yes (2) no (3) don't know
15. If you can't harvest enough hardwood what would you do?
    (1) burn the available hardwood and burn more softwood
    (2) burn the available hardwood and some fuel oil
    (3) switch to fuel oil only
    (4) don't know
16. Where are you cutting your wood fuel?
    (1) personal woodlot (2) friend's woodlot (3) Crown land
    IF 16 (1) CONTINUE TO QUESTION 17, OTHERWISE GO TO QUESTION 26.
17. Is your woodlot involved in the government sponsored Forestry Management Program?
    (1) yes (2) no (3) don't know
    GO TO QUESTION 26.

<u>If Purchasing Wood</u>

18. How are you buying your wood?
    (1) 8 ft. lengths (2) 4 ft. lengths (3) blocked
    (4) blocked and split (5) tree length (6) 8 ft. length slabs
    (7) blocked slabs (8) wood chips/sawdust
19. What kind of wood are you buying?
    (1) only softwood (2) only hardwood (3) mixture: H(75%), S(25%)
    (4) H(50%), S(50%) (5) H(25%), S(75%)
20. How much do you pay for a cord of fuel wood?
    (1) $30 - $40 (2) $40 - $50 (3) $50 - $60 (4) $60 - $70 (5) $70 - $80
    (6) $80 - $90 (7) $90 - $100 (8) $100 - $110 (9) $110 - $120 (10) don't know
21. Does the price you paid for wood include delivery of the wood?
    (1) yes (2) no (3) don't know

22. At what time of year do you usually purchase your supply of wood?
(1) January - March (2) April - June (3) July - September
(4) October - December

23. Are you confident you will be able, over the next 5 years, to buy an adequate supply of softwood?
(1) yes (2) no (3) don't know

24. Are you confident you will be able, over the next 5 years, to buy an adequate supply of hardwood?
(1) yes (2) no (3) don't know

25. If you can't buy enough hardwood what would you do?
(1) burn the available hardwood and burn more softwood
(2) burn the available hardwood and some fuel oil
(3) switch to fuel oil only
(4) don't know
CONTINUE TO QUESTION 26.

26. How many cords of wood do you expect to burn this heating season (Last Fall to this Spring)?
(1) 0 - 1 (2) 1 - 2 (3) 2 - 3 (4) 3 - 4 (5) 4 - 5 (6) 5 - 6
(7) 6 - 7 (8) 7 - 8 (9) 8 or more

27. During 1986 the price of fuel oil...
(1) stayed about the same (2) went up slightly (3) went down slightly
(4) dropped by quite a bit (i.e. more than 5¢/litre) (5) don't know

28. Did the price of fuel oil have any effect on your use of fuel wood this heating season?
(1) used more wood (2) stayed about the same (3) used less wood
(4) switched to oil (5) don't know

29. Do you expect the price of fuel oil to have an effect on your use of fuel wood next heating season?
(1) will use more wood (2) stay about the same (3) use less wood
(4) switch to oil (5) don't know
GO TO QUESTION 33.

<u>Non-Wood Using Respondents</u>

30. What type of heating system do you have in your home?
(1) hot air oil furnace (2) hot water oil furnace (3) electric heat
(4) oil space heater (5) propane heater (6) coal stove
(7) coal furnace (8) heat supplied by landlord

31. Have you used wood to heat your home during the past 15 years?
    (1) yes (2) no (3) don't know
32. Are you considering heating with wood in the future?
    (1) yes (2) no (3) don't know
    CONTINUE TO QUESTION 33.

General Information (All Respondents)

33. What do you consider to be the major advantage of heating with wood?
    (1) Economic - savings, low cost fuel, oil too expensive, etc.
    (2) Other - quality of heat, like being involved, everything else.
34. What do you consider to be the major disadvantage of heating with wood?
    (1) problems of obtaining fuel (2) too much labour required
    (3) dirty wood, ashes, etc. (4) safety
    (5) capital cost of equipment (6) wood is too expensive
35. In what county of Prince Edward Island do you live?
    (1) Prince (2) Queens (3) Kings
36. Are you residing in an urban or rural area?
    (1) rural (2) urban
37. Do you (1) own your own home
    (2) rent